CLAIMS

1. A semiconductor laser device including a semiconductor laser element having a ridge type cladding layer, on a semiconductor substrate,

said semiconductor laser element comprising:

a resonator for performing laser oscillation due to injection of carriers, having different reflectivities at a front facet and a rear facet,

a stripe structure for injecting carriers into the resonator, extending in an axis direction of the resonator, and

an electrode disposed on an upper portion of the stripe structure;

wherein said electrode on the stripe structure is divided into two or more parts so that plural electrode parts are arranged along the resonator axis direction, and

among the plural electrode parts, a current is injected into an electrode part that is positioned in the vicinity of the front facet of the resonator from which laser light is emitted, so as to obtain a larger current density in an active layer of the electrode part as compared with a current density in an electrode part that is positioned in the vicinity of the rear facet of the resonator.

2. A semiconductor laser device as defined in Claim 1 wherein a

transverse mode spectrum of the semiconductor laser element is in a multimode.

3. A semiconductor laser device as defined in Claim 1 wherein said semiconductor laser element has a window region that is positioned in the vicinity of the facet of the resonator.

4. A semiconductor laser device as defined in Claim 1 wherein a voltage on which a radio frequency wave is superposed is applied to at least one of the plural electrode parts.

5. A semiconductor laser device as defined in Claim 4 wherein a voltage on which a radio frequency wave is superposed is applied to an electrode part that is positioned in the vicinity of the rear facet of the resonator.

6. A semiconductor laser device as defined in Claim 4 wherein a voltage on which a radio frequency wave is superposed is applied to an electrode part that is positioned in the vicinity of the front facet of the resonator.

7. A semiconductor laser device as defined in Claim 1 wherein a modulated current is applied to at least one of the plural electrode parts.

8. A semiconductor laser device as defined in Claim 1 wherein said stripe structure has a taper shape in which a stripe width at the front facet of the resonator from which laser light is emitted is larger than a stripe width at the rear facet positioned on the opposite side of the front facet.

9. A semiconductor laser device as defined in Claim 8 wherein assuming that the resonator length is L, the stripe width at the front facet is Wf, the stripe width at the rear facet is Wr, and the stripe width in a position where a distance from the front facet is x is Wx, said stripe structure is formed so as to satisfy a relationship of

$$Wx=Wf-(Wf-Wr)\cdot x/L$$

10. A semiconductor laser device as defined in Claim 9 wherein said stripe structure is formed so as to have a planar shape in which a ratio of the stripe width at the front facet to the stripe width at the rear facet satisfies a relationship of

1<(stripe width at the front facet)/(stripe width at the rear facet)<2

11. A semiconductor laser device as defined in Claim 1 wherein at least one electrode part among the plural electrode parts has a taper shape in which a width on the front facet side is different from a width on the rear facet side.

12. A semiconductor laser device as defined in Claim 1 wherein an electrode part close to the front facet side among the plural electrode parts has a taper shape in which a width on the front facet side is different from a width on the rear facet side.

13. A semiconductor laser device as defined in Claim 1 wherein each of the plural electrode parts has a taper shape in which a width on the front facet side is different from a width on the rear facet side.

14. A semiconductor laser device as defined in Claim 1 wherein

said stripe structure has a resistive layer formed on an upper portion thereof, and

said resistive layer has a resistance value that varies from the front facet of the resonator at which laser light is emitted, to the rear facet.

15. A semiconductor laser device as defined in Claim 1 wherein

a plurality of said semiconductor laser elements are integrated on the semiconductor substrate, and

separation resistive parts for separating adjacent semiconductor laser elements are formed on the semiconductor substrate.

16. A semiconductor laser device as defined in Claim 15 wherein at least one of the plural semiconductor laser elements oscillates laser light with a wavelength that is different from those of other semiconductor laser elements.

17. A semiconductor laser device as defined in Claim 15 wherein at least one of the plural semiconductor laser elements is driven with an injection current that is different from those for other semiconductor laser elements.

18. A semiconductor laser device as defined in Claim 15 wherein at least one of the plural semiconductor laser elements has a width of a stripe structure thereof that is different from widths of stripe structures of other semiconductor laser elements.

19. A semiconductor laser device as defined in Claim 1 wherein an oscillation wavelength of laser light emitted from the semiconductor laser element is 430~455nm.

20. A semiconductor laser device as defined in Claim 1 wherein said semiconductor laser element emits laser light whose vertical mode spectrum is in a multimode.

21. A semiconductor laser device as defined in Claim 1 wherein said semiconductor laser element emits laser light whose vertical

mode spectrum width expands by 1nm or more.

22. A laser projector comprising a semiconductor laser device emitting laser light, and an optical system for projecting laser light emitted from the semiconductor laser device, said semiconductor laser device being a semiconductor laser device as defined in Claim 1.